

WHAT IS CLAIMED IS:

1. A process for producing an ene reaction product comprising thermally reacting at a temperature above about 180°C, and in the substantial absence of halogen, a polyalkene having a number average molecular weight ( $M_n$ ) of from about 300 to about 5000, and a terminal vinylidene content of at least 30%, and an enophile in the presence of from about 10, to about 2000 ppm by weight, based on the weight polyalkene, of free radical inhibitor.
2. The process of claim 1, wherein said polyalkene has a terminal vinylidene content of at least about 50%.
3. The process of claim 1, wherein the reacting group of said enophile is olefinic or carbonyl, and the free radical inhibitor comprises a phenothiazine nucleus.
4. The process of claim 1, wherein said polyalkene is polyisobutene, polybutene or a mixture thereof (PIB) having a  $M_n$  of from about 900 to about 2500, and said enophile is maleic anhydride (MA).
5. The process of claim 4, wherein said free radical inhibitor comprises substituted or unsubstituted phenothiazine.
6. The process of claim 5, wherein said free radical inhibitor comprises unsubstituted phenothiazine.
7. The process of claim 4, wherein the MA and PIB are reacted in a molar ratio (MA:PIB) of from about 0.9 to about 3:1.
8. The process of claim 7, wherein said ene reaction product has a functionality of from about 1 to about 2.
9. The process of claim 8, wherein said ene reaction product has a functionality of from about 1.3 to about 1.7.
10. The process of claim 5, wherein the reaction is conducted in the further presence of from about 10 to about 2000 ppm by weight, based on the weight of PIB, of an oil soluble sulfonic acid.

11. The process of claim 10, wherein at least 50 wt.% of the sulfonic acid is introduced after at least 50% of the PIB has reacted with the MA.
12. The process of claim 4, wherein the reaction is conducted at a temperature of from about 180 to about 260°C, and under a pressure of from about 0 to about 1000 kPa, and said MA is contacted with said PIB such that an initial charge of MA is contacted with the PIB at or prior to the beginning of the reaction, and one or more additional charges of MA are introduced into the resulting reaction mixture subsequent to the beginning of the reaction.
13. The process of claim 4, comprising the additional steps of:
  - (a) cooling the reaction mixture to below 200°C after completion of the reaction;
  - (b) introducing an additional amount of from about 1 to about 10 wt. %, based on the weight of the reaction mixture, MA into the reaction mixture and stirring for a period of from about 0.5 to about 6 hours;
  - (c) stripping the reaction mixture of excess MA;
  - (d) adding a hydrocarbon solvent; and
  - (e) filtering the reaction mixture.
14. The process of claim 4, further comprising reacting the ene reaction product with a nucleophilic reactant.
15. The process of claim 14, wherein said nucleophilic reactant is selected from the group consisting of amine, alcohol, amino-alcohol, metal compound, and mixtures thereof.
16. The process of claim 15, wherein said nucleophilic reactant is a polyamine.
17. The process of claim 14, wherein the reaction product is reacted with the nucleophilic reactant in diluent oil that is at least substantially free from sulfur.